

WEEKLY CLIMATE BULLETIN

This Bulletin is issued weekly by the Climate Analysis Center and is designed to indicate, in a brief concise format, current surface climatic conditions in the United States and around the world. The Bulletin contains:

- Highlights of major climatic events and anomalies.
- U.S. climatic conditions for the previous week.
- U.S. apparent temperatures (summer) or wind chill (winter).
- U.S. cooling degree days (summer) or heating degree days (winter).
- Global two-week temperature anomalies.
- Global four-week precipitation anomalies.
- Global monthly temperature and precipitation anomalies.
- Global three-month precipitation anomalies (once a month).
- Global twelve-month precipitation anomalies (every three months).
- Global three-month temperature anomalies for winter and summer seasons.
- Special climate summaries, explanations, etc. (as appropriate).

Most analyses contained in this Bulletin are based on preliminary, unchecked data received at the Climate Analysis Center via the Global Telecommunications System. Similar analyses based on final, checked data are likely to differ to some extent from those presented here.

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GLOBAL CLIMATE HIGHLIGHTS

MAJOR CLIMATIC EVENTS AND ANOMALIES AS OF JUNE 9, 1990

1. Central United States:

RAIN ABATES SLIGHTLY BUT SEVERE WEATHER BATTERS MANY AREAS.

Heavy rainfall became more scattered across the region, afflicting a swath from east-central Kansas to southwestern Illinois (up to 226 mm in western Missouri), a band from southern Indiana to central Pennsylvania (as much as 168 mm), and isolated locations across the Southeast (up to 119 mm). Fortunately, only light precipitation fell across flood-plagued western Arkansas and eastern Oklahoma, as well as throughout the Tennessee Valley and most of the upper Midwest. Several dozen tornadoes were spawned, particularly across the central Plains and in the middle Mississippi, lower Ohio, and Tennessee Valleys. As of May 31, more tornadoes had been reported nationally than during any other January - May period since records began in 1953. [21 weeks].

2. Southern Texas and Mexico:

EXCESSIVE HEAT SEARS REGION.

Temperatures as high as 47°C baked much of southern Texas and a large portion of Mexico for the fifth consecutive week, prolonging a heat wave that has generated shortages of beef, milk, and fresh water in Mexico, according to press reports. Numerous forest fires have scarred agricultural sections of the country, which have endured weekly temperature departures of up to +5°C. The heat wave has taken the lives of half a million heads of cattle and a few hundred individuals in Mexico [5 weeks].

3. Cuba, the Western Bahamas, and Southern Florida:

TORRENTIAL DOWNPOURS ABATE.

Only light to moderate precipitation dampened southern Florida (48 mm to 117 mm), the western Bahamas, and most of Cuba (30 mm to 65 mm), bringing an end to short-term moisture surpluses [Ended after 3 weeks].

4. Hispaniola, Puerto Rico, and the Eastern Caribbean Islands:

DRY WEATHER PERSISTS.

Little or no rain was reported, increasing the moisture deficits which began developing in early Spring [9 weeks].

5. Southern Brazil and Eastern Paraguay:

HEAVY, UNSEASONABLE RAINFALL DELUGES REGION.

For the second successive week, torrential downpours soaked much of southern Brazil and southeastern Paraguay, with most locations measuring 150 mm to 250 mm of rain. Typically, rainfall totals diminish during the fall and reach a minimum in the winter (June-August) season; however, the recent heavy rainfall has dropped up to 535 mm of rain during the last two weeks, postponing relief for the region which was also deluged by excessively heavy precipitation most of the summer (see front cover) [2 weeks].

6. Europe:

WIDESPREAD MODERATE TO HEAVY RAINFALL PROVIDES RELIEF.

Much of the continent, from southeastern France and northern portions of Italy and Yugoslavia northward, experienced significant relief from the recent dry spell with 40 mm to 120 mm of rain. Only the southern tier of Europe, across the Iberian, Italian, and southern Balkan Peninsulas, and the eastern sections of Scandinavia evaded significant rainfall. Portions of northern Italy were hit by a flash flood that produced several mudslides and washed out an old stone bridge near the towns of Nave, Bovezzo, and Caino [Ending after 6 weeks].

7. The Sahel:

HOT WEATHER PERSISTS.

Temperatures returned to near normal levels across the eastern Sahel, but western sections once again averaged approximately 2°C above normal, prolonging the recent hot spell. Extreme readings up to 45°C baked portions of Senegal and Mali [9 weeks].

8. Eastern India:

COOL SPELL ENDS.

Temperatures moderated to within 1°C of normal, bringing an end to the recent spell of cool weather [Ended after 5 weeks].

9. Southeastern Asia:

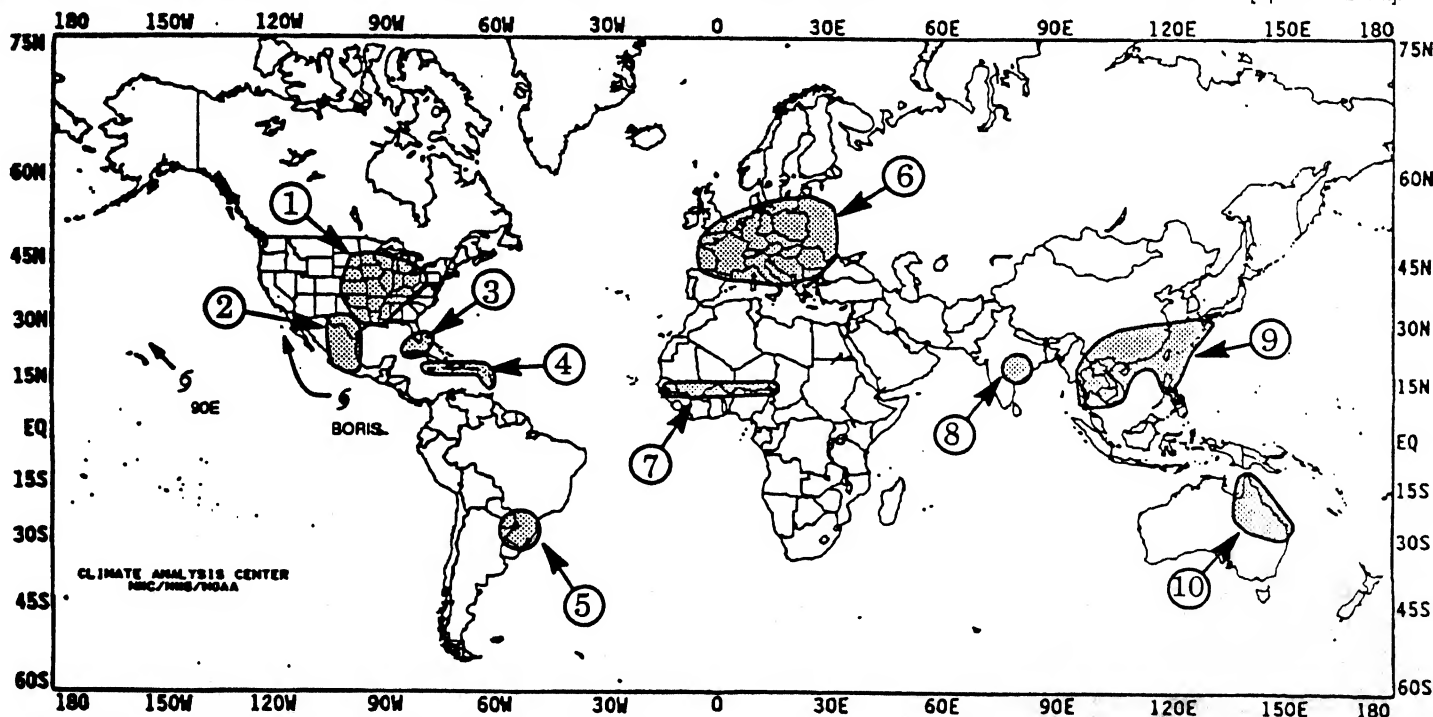
PRECIPITATION SLACKENS IN SOME AREAS.

Rainfall decreased significantly across the Philippines as only scattered locations recorded moderate (40 mm to 80 mm) totals. In addition, rainfall totals decreased slightly in southeastern China, where 70 mm to 150 mm was observed. Unfortunately, extremely heavy rain again fell in the northern half of Thailand (up to 250 mm) and from southern Japan southward along the Ryukyu Island chain and throughout Taiwan (between 100 mm and 350 mm) [11 weeks].

10. Northeastern Australia:

A RARE OCCURRENCE OF HEAVY WINTER RAINFALL

Unseasonably heavy rains fell across most of the northern and eastern portions of Queensland just as the normally dry summer (June - August) season would normally commence. More than twice the normal Winter precipitation fell in a single day at Townville (93 mm) and Hughenden (55 mm) while both Richmond and Hughenden recorded more rain last week than is normally received during the entire April - September period. Across the region, between 70 mm and 125 mm was measured [Episodic Event].



EXPLANATION

TEXT: Approximate duration of anomalies is in brackets. Precipitation amounts and temperature departures are this week's values.

MAP: Approximate locations of major anomalies and episodic events are shown. See other maps in this Bulletin for current two week temperature anomalies, four week precipitation anomalies, long-term anomalies, and other details.

UNITED STATES WEEKLY CLIMATE HIGHLIGHTS

FOR THE WEEK OF JUNE 3 - JUNE 9, 1990

Severe and wet weather continued across the contiguous United States into the first full week of June, but at a reduced level compared to the previous week. This week, the cities of Emporia, Kansas, and Limon, CO were hardest hit by tornadoes. According to reports, the twister that plowed through the center of Limon and destroyed over 75% of the business area was but one of seven tornadoes that touched down in eastern Colorado late Wednesday. Farther east, one of the four twisters reported in Emporia on Thursday carved a path 3 blocks wide and 8 blocks long, injuring several people and causing extensive property damage. The next day, additional tornadoes swept through the Emporia area, but caused minor damage. Fortunately, no lives were lost in either location.

Once again, localized heavy rains pelted portions of the central and eastern Ohio Valleys, producing flash flooding in western Missouri, southern Indiana, and eastern Kentucky. Approximately 3000 residents were evacuated from Sandusky Lake, OH on Saturday as rising lake waters threatened to breach an aging retaining wall. Intense thunderstorms also lashed parts of the lower Mississippi Valley. On Monday, up to 4 inches of rain soaked southwestern Arkansas while Lubbock, TX received 5.26 inches in TWO hours. In southern Florida, however, long-term dryness continued to be eased as moderate to heavy rains fell across the region for the third straight week. Additionally, light to moderate precipitation fell across much of North Dakota for the fourth successive week, moistening dry topsoil but unfortunately doing little to replenish subsoil reserves. Rare June rains also dampened drought in southern California as moisture from the remnants of Hurricane Boris triggered scattered showers and thunderstorms in the Southwest.

During the first part of the week, the intense storm system responsible for the Midwestern tornado outbreak on June 2 moved northward into Ontario while its cold front tracked eastward, triggering strong thunderstorms along the Atlantic Seaboard. A large dome of high pressure moved southeastward out of Canada into the Midwest, bringing seasonably cool but dry weather to much of the eastern half of the country. In the West, a storm system tracked across the Pacific Northwest, generating showers across the region. Farther south, hot weather, with readings above 110°F, baked much of the desert Southwest.

By mid-week, the Pacific storm system had rapidly progressed eastward into the northern half of the Plains. As a result, numerous showers and thunderstorms, some of them severe, developed throughout the upper and middle Mississippi and lower Ohio Valleys. On Wednesday, eight tornadoes touched down in Kentucky and Tennessee while there were numerous reports of large hail and damaging winds in southern Indiana and central Missouri. The next morning around sunrise, thunderstorms spawned four twisters around Louisville, KY. Intense thunderstorms also formed in eastern Colorado, producing large hail, damaging winds, and several tornadoes. Meanwhile, another cold front quickly tracked eastward across the Pacific Northwest into the northern Rockies.

Towards the week's end, the cold front in the Plains became stationary from Missouri eastward to Maryland while the cold front in the northern Rockies advanced southeastward into the upper and middle Mississippi Valleys and the central Great Plains. On Saturday, the stationary front in the East gradually pushed northward as a warm front while the southern section of the cold front in the central U.S. became stalled across the central Plains and Tennessee Valley. There were numerous cases of severe weather throughout the central Rockies and Plains, the lower Missouri and Ohio Valleys, and the mid-Atlantic. Another round of powerful thunderstorms in eastern Colorado Saturday afternoon spawned eleven tornadoes, but fortunately no injuries were reported. In the West, another storm system entered the Pacific Northwest while moisture from the remnants of Hurricane Boris generated scattered showers and thunderstorms in the desert Southwest and along the extreme southern California coast.

According to the River Forecast Centers, the greatest weekly totals (more than 3 inches) were observed in the lower Missouri Valley, eastern Corn Belt, central Appalachians, extreme southern Florida, and at scattered locations in extreme southeastern and northeastern Texas, southwestern Arkansas, southeastern Oklahoma, and central Mississippi (Table 1). Elsewhere, heavy precipitation fell along the Pacific Northwest Coast, on parts of the central Great Plains, lower Mississippi and Ohio Valleys, and at isolated stations in the Southeast and southern Atlantic Coast states.

Light to moderate amounts occurred in southern California and Arizona, across the Pacific Northwest and the northern thirds of the Intermountain West and Rockies, the northern half of the Plains, eastern Texas, and much of the country east of the Mississippi River. Little or no precipitation was recorded in the remainder of the southwestern quarter of the U.S., in parts of the south-central Great Plains, lower Mississippi Valley, and central Gulf Coast, and most of North Carolina. Much of Alaska and Hawaii generally recorded light precipitation.

Temperatures averaged slightly to much above normal across the southern tier of states and throughout most of the West. The greatest departures (more than +6°F) were found in the Southwest and the southern Plains (Table 2) as readings in these areas soared into the triple-digits (up to 119°F at Imperial, CA on June 3), setting several new daily record highs early in the week. Farther north, unseasonably mild weather persisted across Alaska as temperatures at many locations pushed into the seventies (87°F at Bettles on June 3), and departures were as large as +10°F. Temperatures across the Hawaiian Islands were slightly above normal.

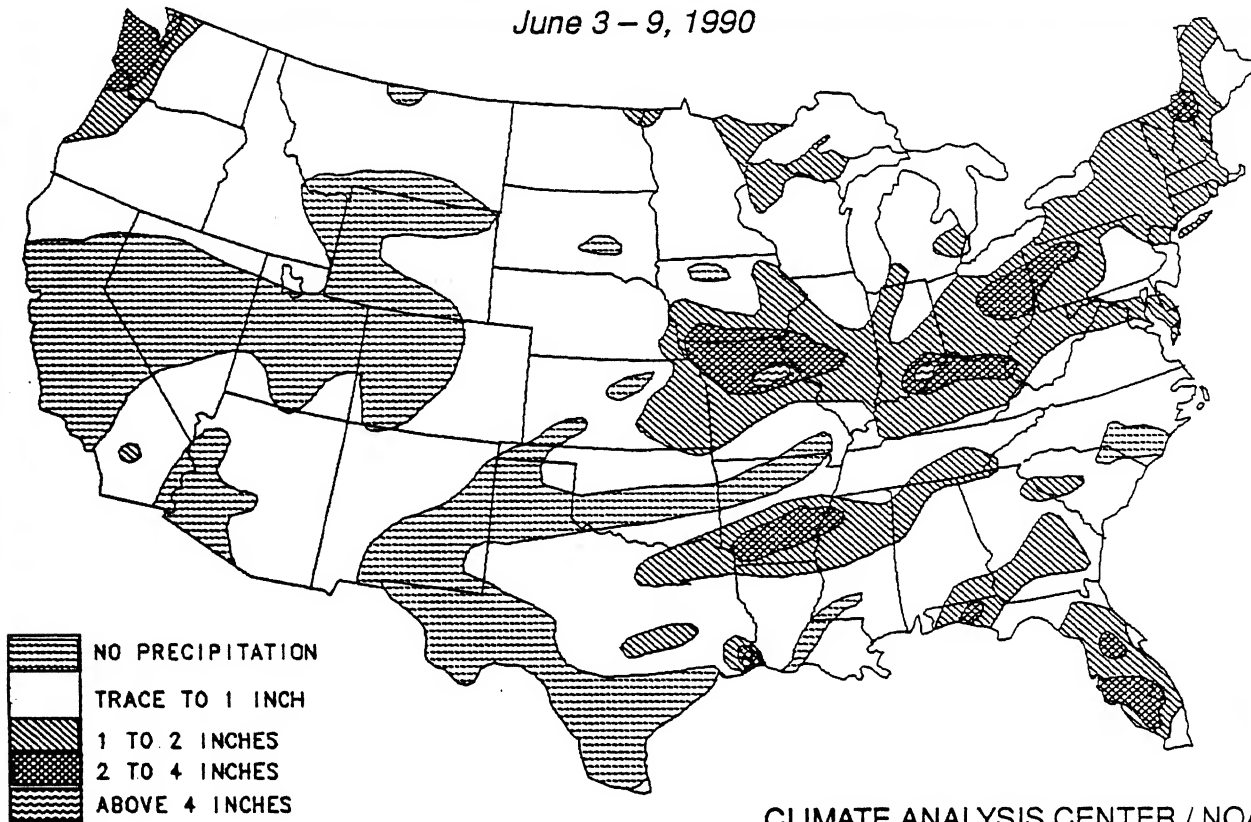
In contrast, unseasonably cool weather prevailed across the extreme northern Intermountain West and Rockies, the northern half of the Plains, the Midwest, and the Northeast. Temperatures averaged more than 5°F below normal in the middle Mississippi Valley, the western Great Lakes region, and central Washington (Table 3). Lows dipped into the thirties across the northern and central Rockies, northern Plains, upper Midwest, Great Lakes region, and Northeast (Figure 1) as about a dozen stations in the latter two regions set new daily minimum temperature records early in the week.

TABLE 1. Selected stations with 2.00 or more inches of precipitation for the week.

STATION	TOTAL (INCHES)	STATION	TOTAL (INCHES)
COLUMBIA, MO	4.54	SEATTLE-TACOMA, WA	2.42
BELLINGHAM, WA	3.48	AKRON, OH	2.42
EL DORADO, AR	3.44	KNOX NOSTER/WHITEMAN AFB, MO	2.39
TACOMA/MCCHORD AFB, WA	3.38	ZANESVILLE, OH	2.34
TACOMA/FT LEWIS/GRAY AAF, WA	3.04	OLYMPIA, WA	2.33
MT. WASHINGTON, NH	2.98	JACKSON, KY	2.30
QUILLAYUTE, WA	2.82	WASHINGTON/NATIONAL, DC	2.27
LOUISVILLE/STANDIFORD, KY	2.80	ASTORIA, OR	2.22
TEXARKANA, AR	2.78	MANSFIELD, OH	2.20
ORLANDO, FL	2.71	PINE BLUFF, AR	2.20
DUBOIS, PA	2.64	VALPARAISO/EGLIN AFB, FL	2.17
COLUMBUS, OH	2.54	ST. LOUIS, MO	2.07
KANSAS CITY/INTL., MO	2.44	LYNCHBURG, VA	

OBSERVED PRECIPITATION

June 3 - 9, 1990



CLIMATE ANALYSIS CENTER / NOAA

TABLE 2. Selected stations with temperatures averaging 7.0°F or more ABOVE normal for the week.

STATION	DEPARTURE (°F)	AVERAGE (°F)	STATION	DEPARTURE (°F)	AVERAGE (°F)
VICTORVILLE/GEORGE AFB, CA	+11.9	80.7	WINK, TX	+8.0	87.9
SAN BERNARDINO/NORTON AFB, CA	+10.9	79.1	AMARILLO, TX	+7.9	80.4
BLANDING, UT	+10.6	74.5	KODIAK, AK	+7.9	55.4
TALKEETNA, AK	+10.4	62.7	CARLSBAD, NM	+7.7	86.4
PHOENIX, AZ	+9.4	93.3	ANCHORAGE, AK	+7.7	60.2
GLENDALE/LUKE AFB, AZ	+9.1	90.9	EL PASO, TX	+7.6	87.1
TUCSON/DAVIS-MONTHAN AFB, AZ	+8.5	87.9	TONOPAH, NV	+7.6	71.2
MIDLAND, TX	+8.4	86.7	CEDAR CITY, UT	+7.5	70.7
LUBBOCK, TX	+8.4	84.0	MCGRATH, AK	+7.4	60.4
PRESCOTT, AZ	+8.4	72.3	PASO ROBLES, CA	+7.3	73.9
ROSWELL, NM	+8.1	84.1	TUCSON, AZ	+7.2	87.8
YUMA, AZ	+8.0	92.6			

TABLE 3. Selected stations with temperatures averaging 4.5°F or more BELOW normal for the week.

STATION	DEPARTURE (°F)	AVERAGE (°F)	STATION	DEPARTURE (°F)	AVERAGE (°F)
WENATCHEE, WA	-7.0	58.2	DES MOINES, IA	-5.2	63.7
ROCHESTER, MN	-6.2	58.1	GRAND RAPIDS, MI	-4.9	60.2
WATERLOO, IA	-6.1	60.6	PARK FALLS, WI	-4.8	55.3
CEDAR RAPIDS, IA	-6.1	62.1	SIOUX FALLS, SD	-4.8	60.8
MUSKEGON, MI	-6.0	57.1	MOLINE, IL	-4.8	63.9
DUBUQUE, IA	-6.0	59.3	EAU CLAIRE, WI	-4.7	59.0
MASON CITY, IA	-5.7	60.1	MADISON, WI	-4.7	59.6
WAUSAU, WI	-5.4	56.7	WATERTOWN, SD	-4.6	58.3
OTTUMWA, IA	-5.4	64.2	ABERDEEN, SD	-4.5	59.1
LA CROSSE, WI	-5.3	60.8			

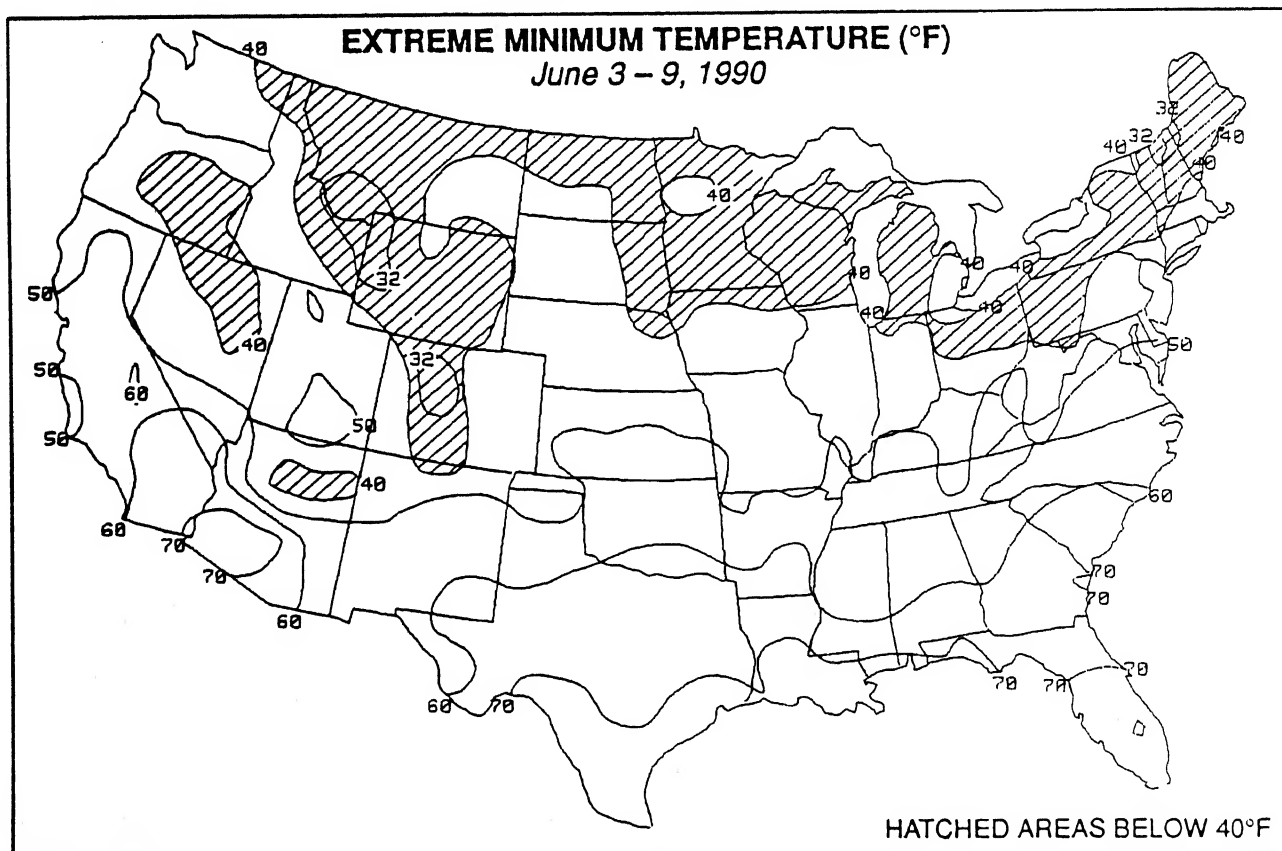
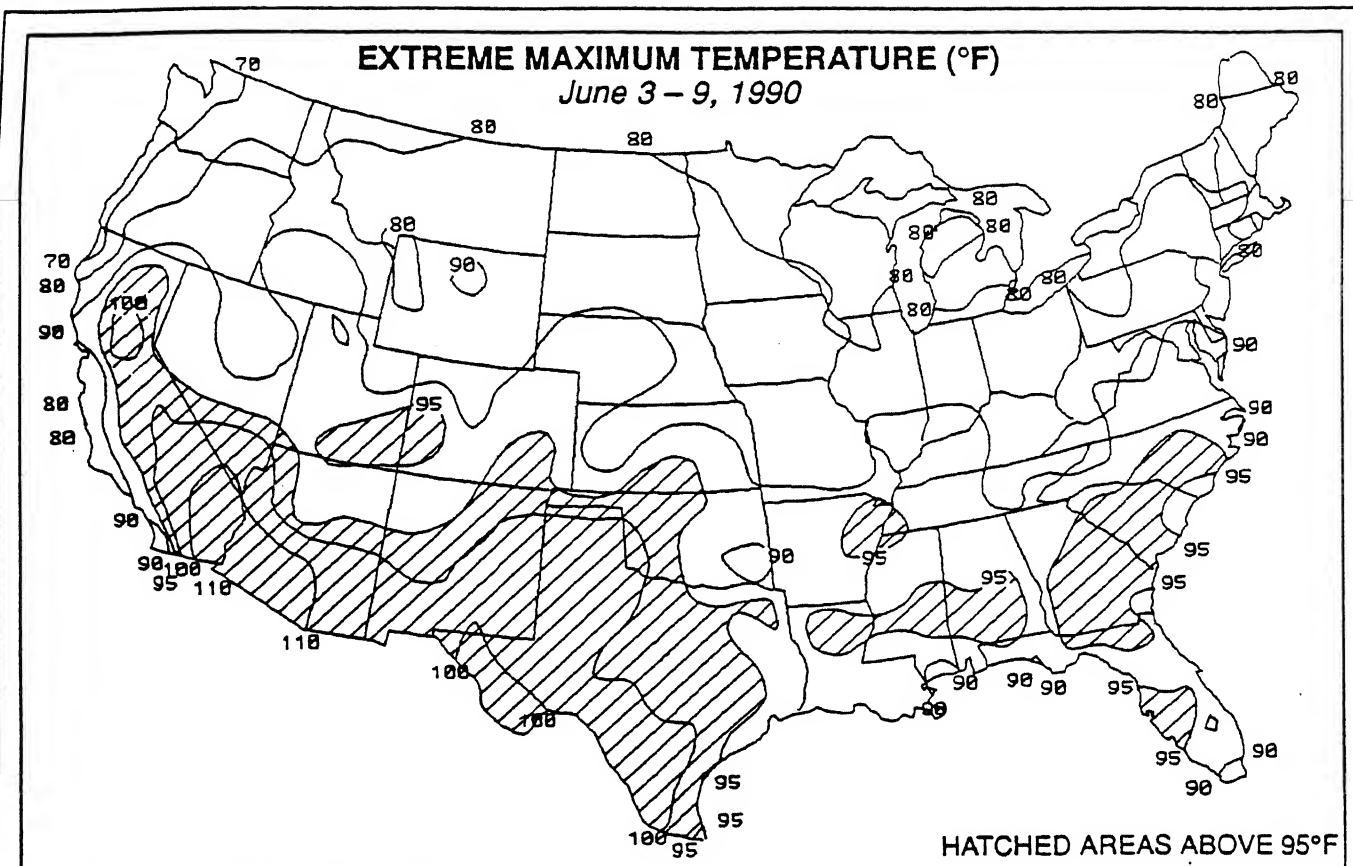
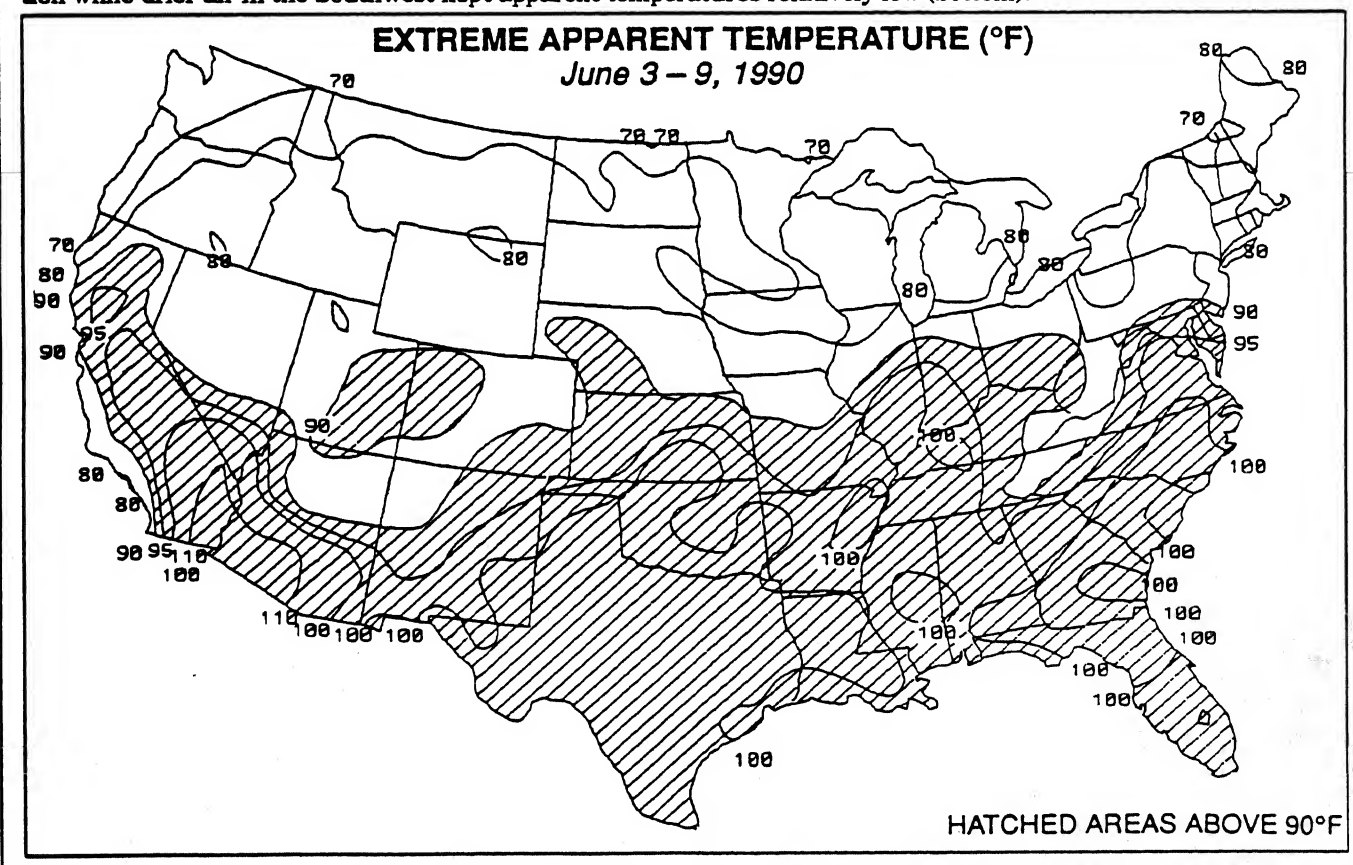


Figure 1. Extreme minimum temperatures (°F) for the week of June 3-9, 1990. Shaded areas are less than 40°F. Unseasonably cool weather prevailed across the northern tier of states, especially early in the week, as readings dropped into the thirties in the northern and central Rockies, northern Plains, upper Midwest, and New England. Several locations in the Ohio Valley and mid-Atlantic set new daily minimum temperature records on Tuesday.

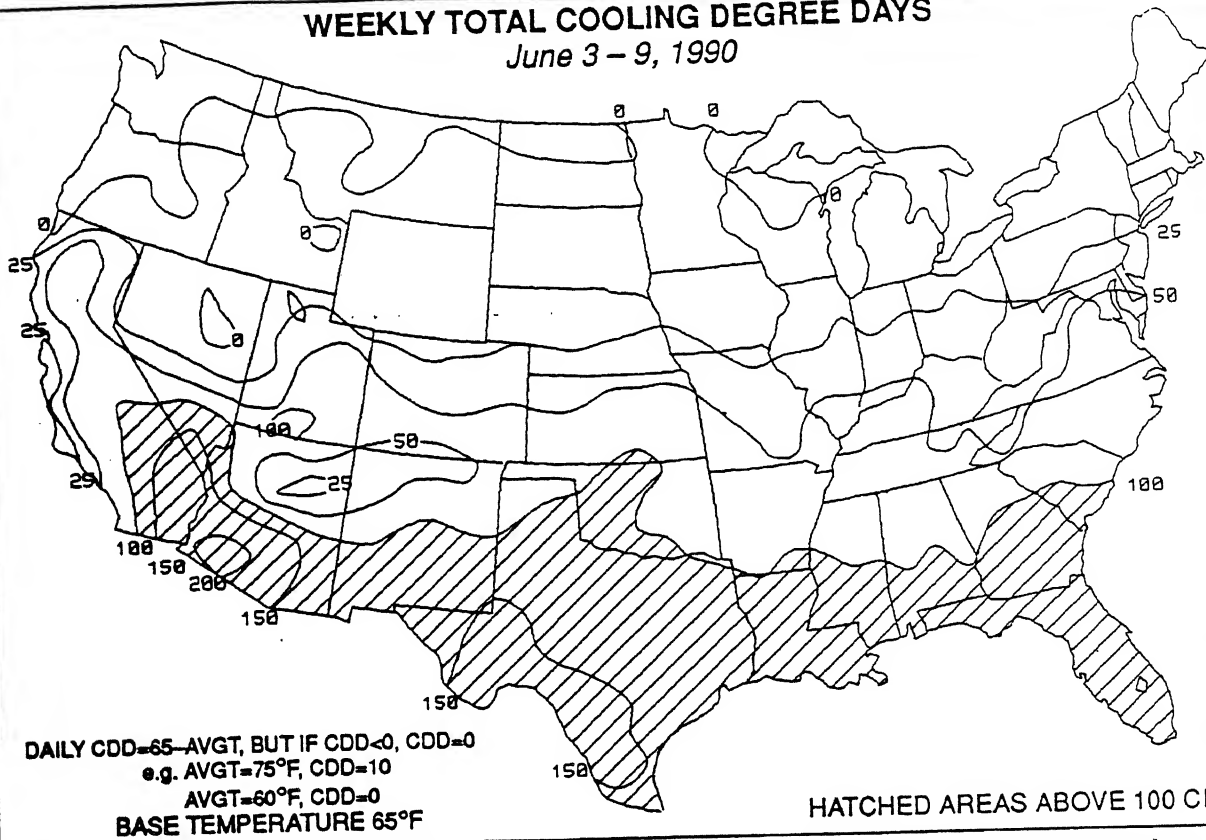


Temperatures surpassed 90°F across the southern half of the country and hit triple-digits in central California, the desert Southwest, and the southern Great Plains (top). The high temperatures, combined with high humidity, produced apparent temperatures in the extreme caution category (90°F – 105°F) throughout the southeastern quarter of the nation while drier air in the Southwest kept apparent temperatures relatively low (bottom).



WEEKLY TOTAL COOLING DEGREE DAYS

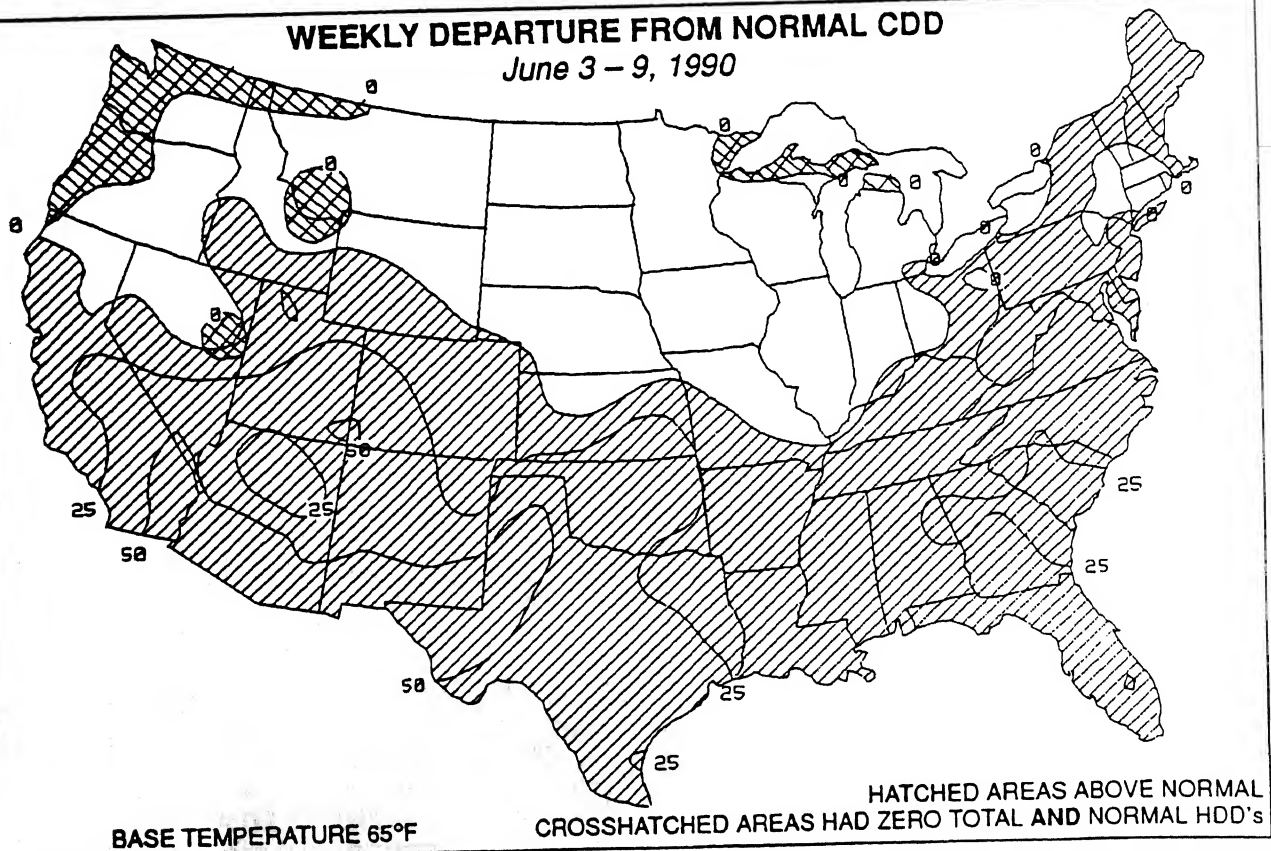
June 3 - 9, 1990



Unseasonably warm weather covered much of the southern tier of states, particularly the Southwest and Rio Grande Valley, as many of the aforementioned areas accumulated more than 150 CDDs (top) and observed much above normal weekly cooling demand [departures more than +50 CDDs] (bottom).

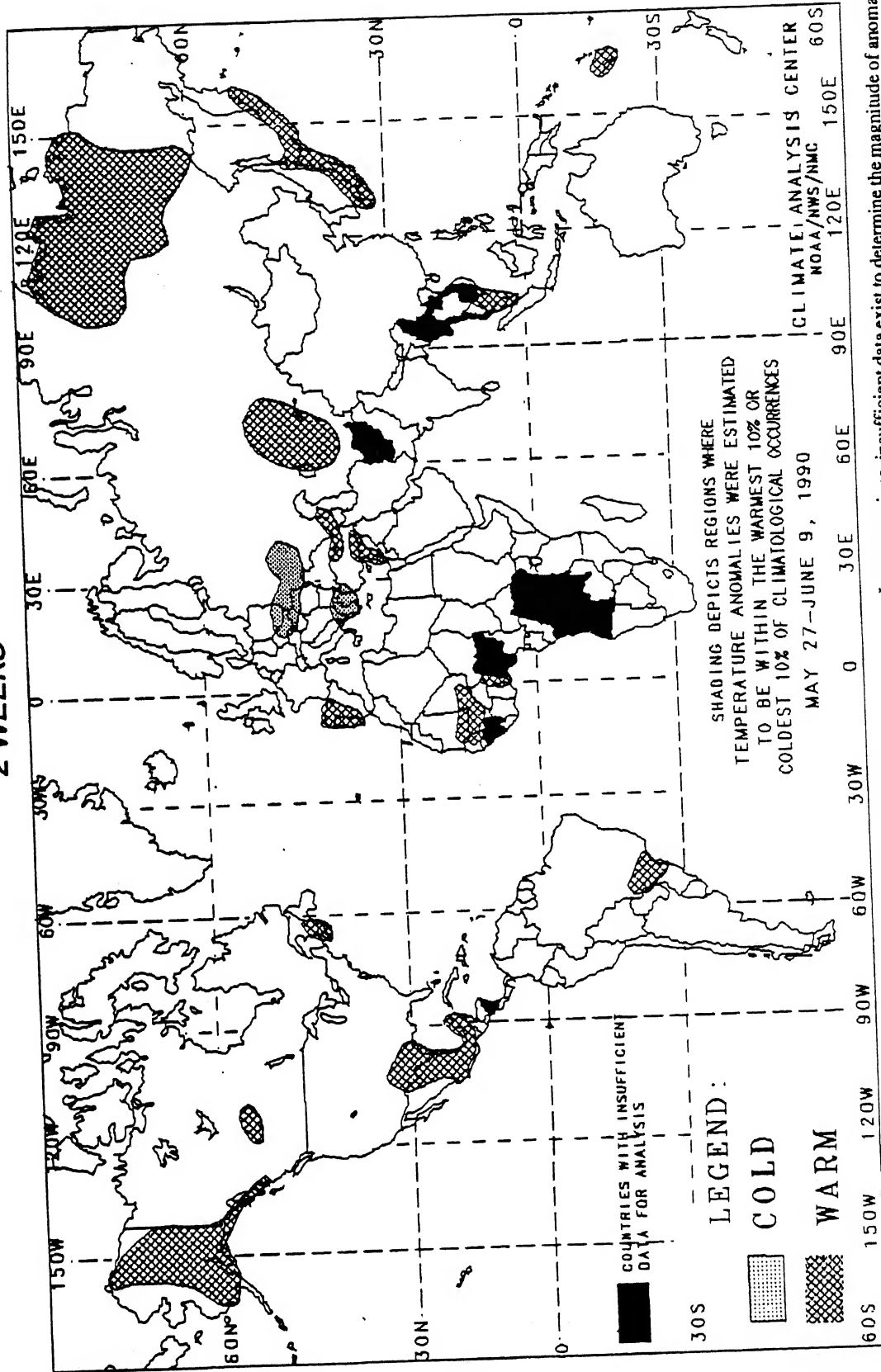
WEEKLY DEPARTURE FROM NORMAL CDD

June 3 - 9, 1990



GLOBAL TEMPERATURE ANOMALIES

2 WEEKS



The anomalies on this chart are based on approximately 2500 observing stations for which at least 13 days of temperature observations were received from synoptic reports. Many stations do not operate on a twenty-four hour basis so many night time observations are not taken. As a result of these missing observations the estimated minimum temperature may have a warm bias. This in turn may have resulted in an overestimation of the extent of some warm anomalies.

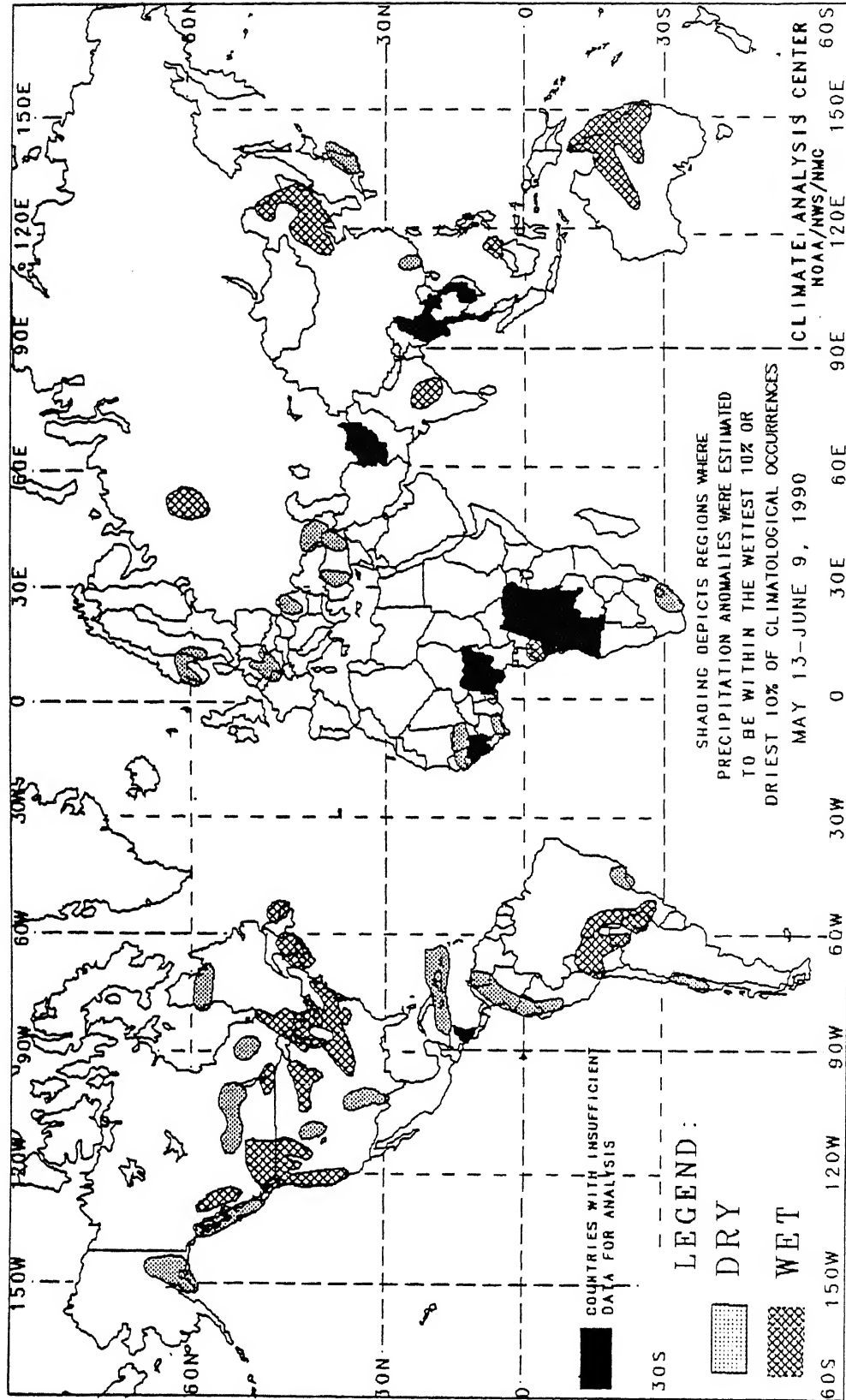
Temperature anomalies are not depicted unless the magnitude of temperature departures from normal exceeds 1.5°C.

In some regions, insufficient data exist to determine the magnitude of anomalies. These regions are located in parts of tropical Africa, southwestern Asia, interior equatorial South America, and along the Arctic Coast. Either current data are too sparse or incomplete for analysis, or historical data are insufficient for determining percentiles, or both. No attempt has been made to estimate the magnitude of anomalies in such regions.

This chart shows general areas of two week temperature anomalies. Caution must be used in relating it to local conditions, especially in mountainous regions.

GLOBAL PRECIPITATION ANOMALIES

4 WEEKS



The anomalies on this chart are based on approximately 2500 observing stations for which at least 27 days of precipitation observations (including zero amounts) were received or estimated from synoptic reports. As a result of both missing observations and the use of estimates from synoptic reports (which are conservative), a dry bias in the total precipitation amount may exist for some stations used in this analysis. This in turn may have resulted in an overestimation of the extent of some dry anomalies.

In climatologically arid regions where normal precipitation for the four week period is less than 20 mm, dry anomalies are not depicted. Additionally, wet anomalies for such arid regions are not depicted unless the total four week precipitation exceeds 50 mm.

In some regions, insufficient data exist to determine the magnitude of anomalies. These regions are located in parts of tropical Africa, southwestern Asia, interior equatorial South America, and along the Arctic Coast. Either current data are too sparse or incomplete for analysis, or historical data are insufficient for determining percentiles, or both. No attempt has been made to estimate the magnitude of anomalies in such regions.

The chart shows general areas of four week precipitation anomalies. Caution must be used in relating it to local conditions, especially in mountainous regions.

SPECIAL CLIMATE SUMMARY

EL NIÑO SOUTHERN OSCILLATION (ENSO) DIAGNOSTIC ADVISORY 90/5

issued by

*DIAGNOSTICS BRANCH
THE CLIMATE ANALYSIS CENTER
NATIONAL METEOROLOGICAL CENTER, NWS*

June 11, 1990

Near normal low-level winds and equatorial convection prevailed during May despite the presence of positive sea surface temperature (SST) anomalies. For the second consecutive month, equatorial 850 mb winds were near normal. Also, convection in the central equatorial Pacific returned to near normal in May after four months of enhanced activity. The Southern Oscillation Index jumped to +1 in May, continuing an upward trend which began in march 1990. Thus, the atmospheric indices for May in the tropical Pacific were not indicative of warm episode conditions.

Indices in all three Niño regions were near 0.5°C and the time-longitude section of SST (Figure 1) shows a large displacement of the 28°C isotherm. Positive SST anomalies (Figure 2) cover the entire eastern two-thirds of the equatorial Pacific representing an increase in the SST by as much as 3°C. The warmest water (near 30°C) is found in the western equatorial Pacific just north of

the equator. The isotherm has decreased nearly 50 m along the equator in the central Pacific and increased in the eastern Pacific during the last six months (Figure 3). This reduction in the east-west slope of the isotherm had occurred in early 1987. The deepening of the equatorial thermocline in the eastern half of the Pacific in 1990 was accompanied by an increase in SST anomalies, which are, however, weak in the eastern Pacific during 1987.

Future developments may well depend on the evolution over the next several months of the mass of warm water in the eastern Pacific. In early 1986, a similar pool of warm water shifted northward into the region of the northern summer season and then shifted back to the equator near the date line during the winter season. Most ENSO prediction models presently indicate continued warming for the next several months for the equatorial Pacific between 120°W and 170°W, but with positive anomalies not exceeding 1°C.

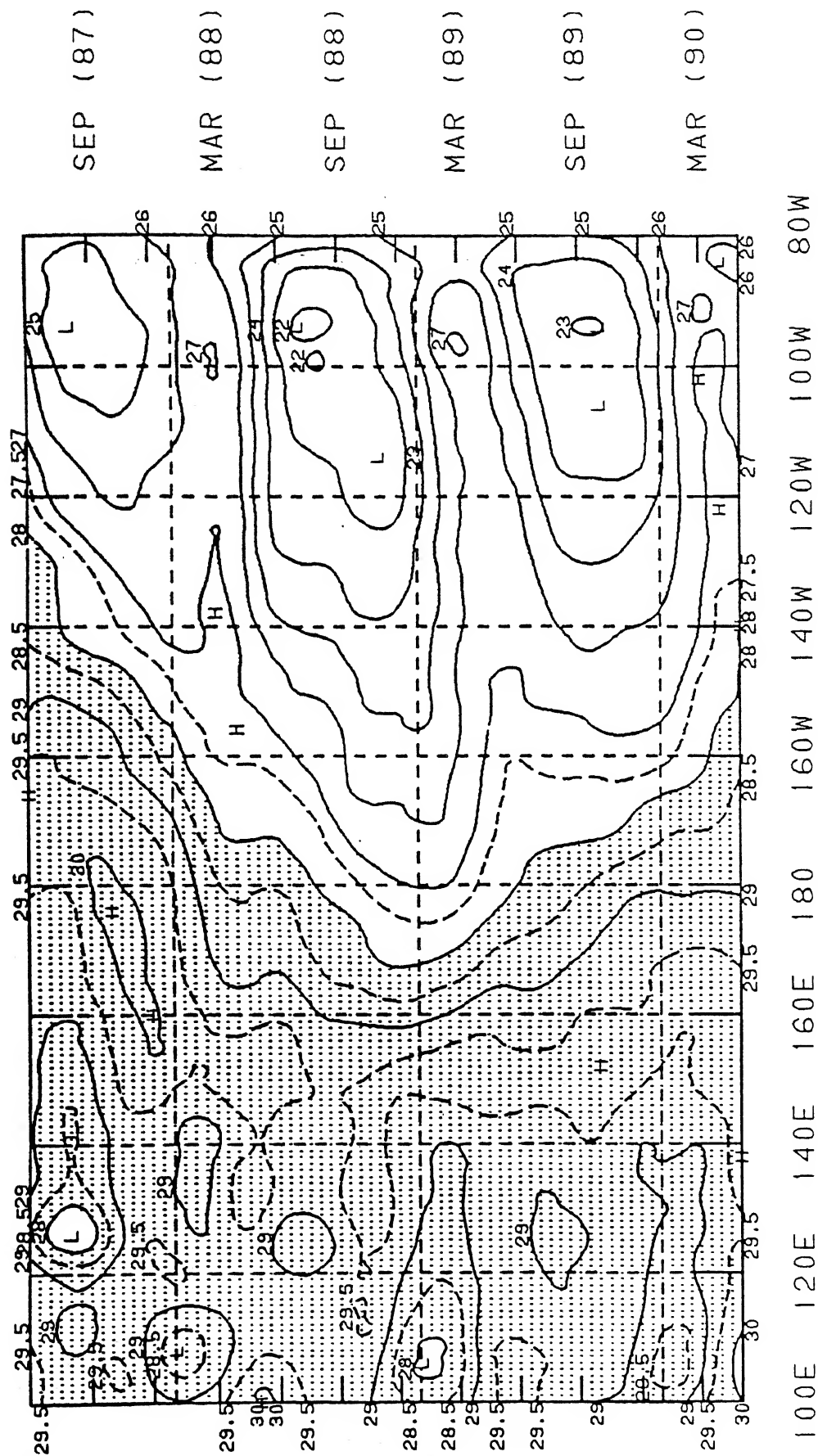


Figure 1. Time-longitude section of monthly mean sea surface temperature (SST) for 5°N-5°S. Contour interval is 1°C with intermediate contours drawn for SST values greater than 27°C. Values greater than 28°C are shaded.

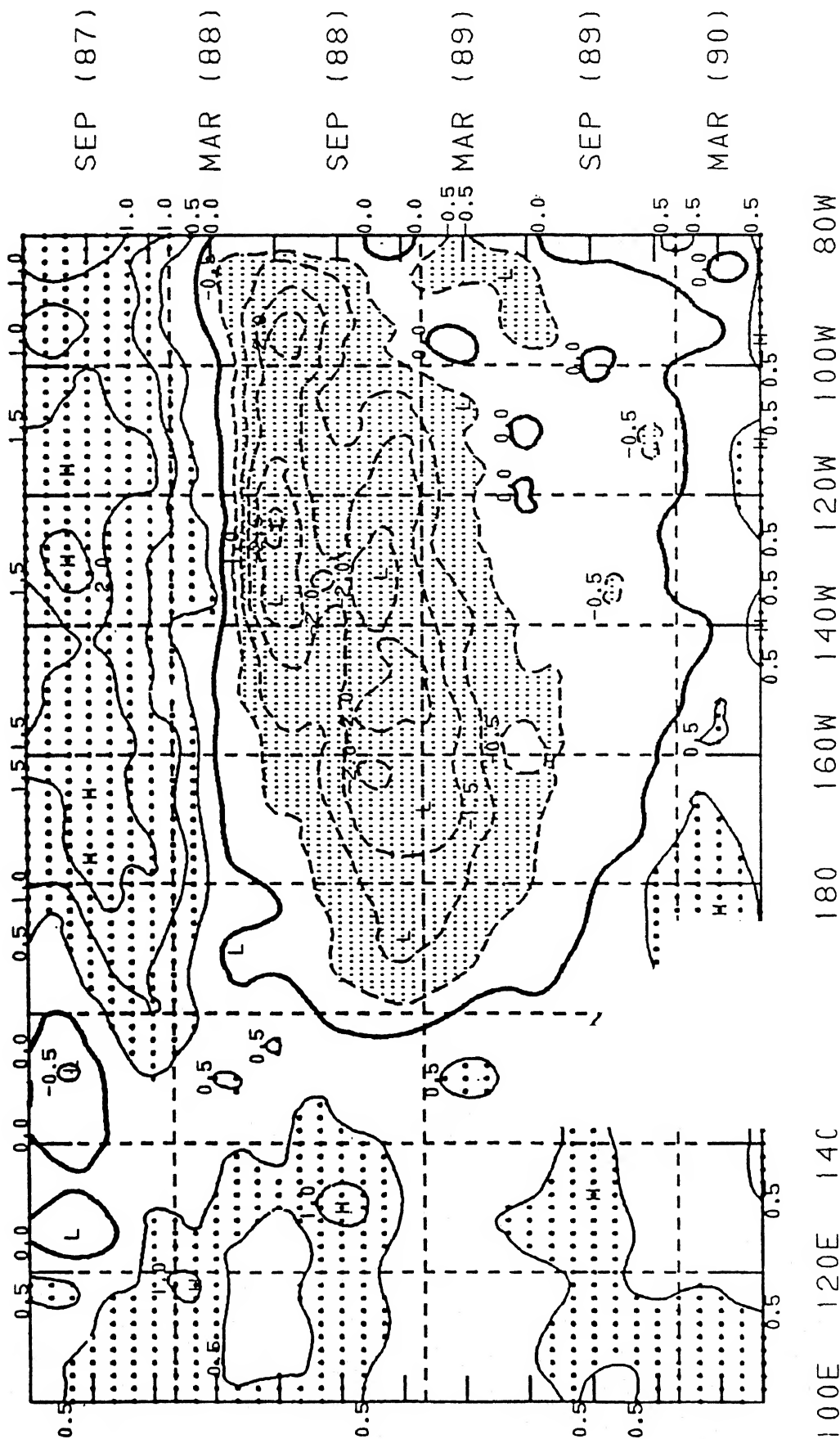


Figure 2. Time-longitude sea surface temperature anomalies for 5°N-5°S. Contour interval is 0.5°C. Values greater than -0.5°C are marked with small [large] dots.

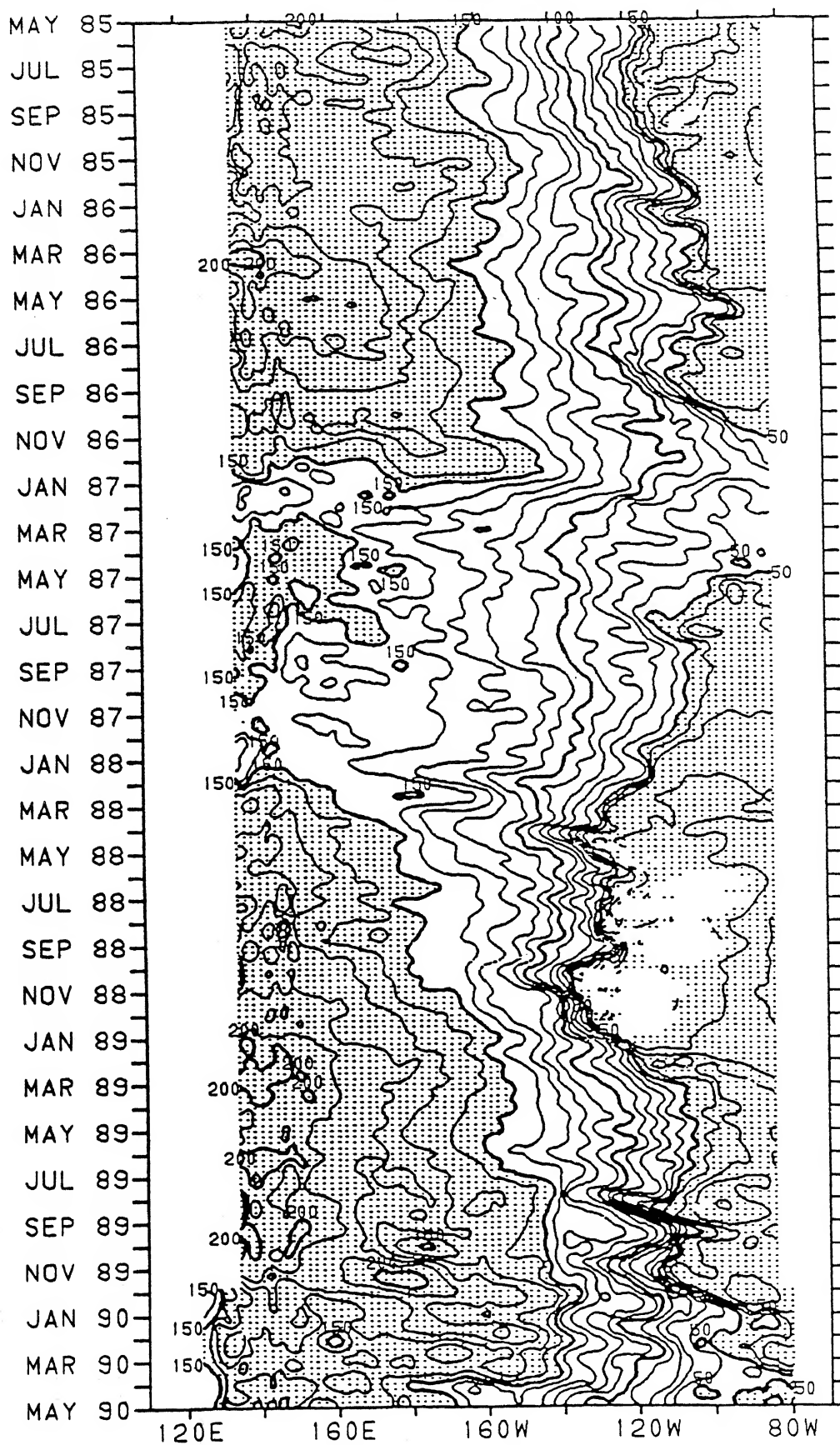


Figure 3. Depth of the 20°C isotherm along the equator in the Pacific Ocean. The contour interval is 10 m with shading for values less than 50 m and greater than 150 m.

ATTENTION:

Due to severe computer problems and delays, the U.S. May 1990 Climate Summary and the U.S. Spring 1990 Climate Summary will be delayed by at least one week. Barring no further difficulties, the WCB #90/24 should contain the U.S. monthly summary, and the WCB #90/25 should contain the U.S. seasonal summary. We are sorry for the delay.